

SYNOPSIS OF *SUAEDA* (CHENOPODIACEAE) IN NORTH AMERICA

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ABSTRACT

The study of North American specimens of the halophytic genus *Suaeda* has led to recognition of 14 species and five varieties, plus two species of doubtful status. Taxonomic problems associated with the succulent habit of *Suaeda* and the historical development of the genus are discussed. Distribution, typification and systematics of the species are presented with citation of specimens from each county or district recorded.

Suaeda, a chenopodiaceous genus of sea coasts and inland saline soils, has long been a source of confusion to taxonomists and generally ignored by collectors. It is a relatively unattractive plant and species' characteristics are not easily noted without magnification. Dried specimens do not always show the same leaf and calyx features as fresh, succulent plants, and leaf shape in cross section varies with the degree of salinity of the habitat.

The plants seem to exhibit phenotypic plasticity which has not previously been taken into account by taxonomists in treatments of *Suaeda*. Succulence and roundness of the leaf in cross section increases with increasing salinity of habitat. In his study on halophytes Ungar (1974) found that even the habit of *Suaeda*, particularly *S. depressa* and *S. maritima*, varies according to the salinity of the soil. He reported that in highly saline soils *S. depressa* will be dwarfed with a prostrate growth form, or appear as a weak, single-stemmed upright plant; both forms under 20 cm. long. In conditions of lower salt concentration the plants exhibit a more robust growth form. A single main shoot or several strong shoots 30 to 100 cm. long may be produced. We observed similar habit differences for *S. depressa* around alkaline lake beds in northern California and south central Oregon.

There is also some question about the effects of heat and moisture on the degree of pubescence. Observations made by Henrickson (personal communication) of the very pubescent shrub *S. suffrutescens* in northern Mexico seem to indicate that the plants are pubescent in very dry years and glabrous or nearly so in wetter years. The phenotypic expression in relation to habitat conditions needs further investigation, perhaps before a world-wide monograph on *Suaeda* can be attempted.

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Characters that are constant, and presumably reliable at the species level, appear to be: herbaceous versus suffrutescens habit, inflorescence types (including density of glomerules), leaf shape and internode length, calyx features and seed size. There are five basic calyx types noted in North American specimens (sepals thin and rounded; sepals thickened and hooded at the apex; sepals sharply horned [corniculate] and hooded at the apex; sepals hooded at apex and inflated vertically or keeled [carinate]; sepals hooded at apex, or corniculate, and inflated vertically as well as basally [forming both a keel and transverse wing]).

It must be kept in mind that these plants are very succulent, so that the calyx and leaves will flatten or shrivel upon drying. Our examination of fresh and dry specimens has shown that the basic calyx remains constant. The following glossary to sepal characters and Figure 1 may be helpful in interpreting terminology related to calyx types employed in the key and descriptions.

Carinate: keeled, with a vertical ridge or dorsal inflation from base to apex

Corniculate: horned, pointed, with one or more projecting dorsal appendages; may be furrowed or folded upon drying

Crispate: undulating or very wavy dried keel

Cucullate: hooded, rounded at the apex over the seed, usually thickened and not horned nor keeled

Inflated lobe: dorsal thickening of sepal or swelling to form a vertical ridge, basal swelling or tubercle-like projection

Rounded: not inflated dorsally nor greatly thickened at apex, usually a thin sepal closely fitting over seed

Transverse wing: flattened horizontal projection, usually circumbasal and irregular; a dry, basally inflated lobe.

Suaeda might be confused with other genera of Chenopodiaceae and the following comparisons may help differentiating among them:

Suaeda: flat, spiral embryo; endosperm scant or lacking; pubescence short or absent; leaves simple, linear; usually with three scarious floral bracts; fruiting calyx rounded, cucullate, corniculate, or may be transversely winged at base

Halogeton: spiral embryo; endosperm scant or lacking; pubescence pilose, especially in inflorescence; leaves linear, tipped with a short conical tubercle prolonged to a bristle; flowers bracteolate; fruiting calyx horizontally winged near the apex

Kochia: annular embryo; endosperm present; pubescence simple, villous to tomentose in inflorescence; leaves simple, linear; no scarious bracts present; fruiting calyx rounded, enclosing fruit, becoming carinate to winged horizontally toward the base, cleft no more than halfway to base

Bassia: annular embryo, endosperm present; pubescence pilose or tomentose, especially in inflorescence; leaves linear to lanceolate; bracts one to two, greenish; fruiting calyx cleft more than halfway to base, armed with a short and blunt to elongated and hooked spine from the back of each lobe.

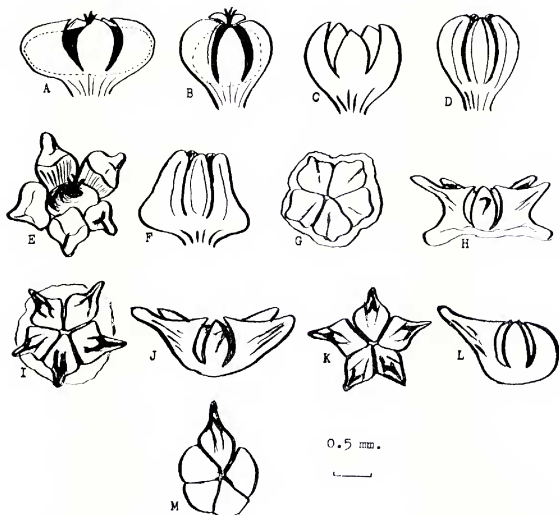


Figure 1. Calyx types of *Suaeda* in North America.

- I. Sepals thin, rounded, not inflated, as *S. maritima* (A).
- II. Sepals thickened at apex, hooded (cucullate), as *S. torreyana* (B—fresh, C—dried, mature).
- III. Sepals inflated vertically, keeled (carinate) as *S. linearis* (D—fresh, E—dried, mature).
- IV. Sepals inflated vertically as well as obliquely to the base, forming a keel and a transverse wing upon drying, as *S. jacoensis* and *S. mexicana* (F, G), and *S. occidentalis*, which is corniculate and winged (H, I).
- V. Sepals appendaged dorsally with horn-like projections (corniculate), as *S. depressa* (J, K), and *S. americana* (L, M).

Historically, species that were eventually named *Suaeda* were segregated from the Linnaean (1753) genera *Chenopodium* and *Salsola* by Meyer (1829), who included them in his new genus *Schoberia*. Moquin-Tandon (1840), in his *Chenopodearum Monographica Enumeratio*, divided Chenopodiaceae into two "suborders" and created six more synonyms for *Suaeda* based upon such relatively inconstant characters as seed vertical or seed horizontal.

In 1896 Druce published the names *Dondia fruticosa* (Forsk.) and *D. maritima* (Dum.), transferring them from *Suaeda* to revitalize *Dondia* Adanson 1763. The use of *Dondia* was retained by Heller in 1898 and 1910 with his transfer of ten more species from *Suaeda*, and the name was also used by Standley in his publication on Chenopodiales in *North American Flora* (1916). In 1918 Macbride transferred *Dondia* back to *Suaeda*, and was followed by Standley in 1929 and 1930.

In 1954 action by the International Botanical Congress conserved *Suaeda* against *Dondia* and also against *Lerchea* Rueling 1774; the latter an illegitimate orthographical variant of *Lerchia* A. Haller ex Zinn 1757, which was also unavailable because of *Lerchea* Linnaeus 1771 *nom. cons.* *Dondia* was a superfluous name for *Lerchia*, so was also illegitimate. This congress conserved *Suaeda*, based on Forskal, but did not provide a generic description. To avoid conserving a *nomen nudum*, Brenan (1954) proposed the solution by amending the name and citing the first valid publication for *Suaeda*, which is Scopoli (1777). As finally accepted and published by Ricketts and Stafleu (1960) the citation for *Suaeda* is: *Suaeda* (Forsk., Fl. Aegypt. Arab. 69 t. 181. 1775) ex Scopoli, Intr. 333. 1777, excl. verba falsa "Capsula quinquevalvis . . . polysperma." The type species is *S. vera* Forskal ex J. F. Gmelin (1791).

The first revision of North American Chenopodiaceae was published by Sereno Watson in 1874. He delimited seven species of *Suaeda*, amending and adding to his 1871 publication, which was based upon specimens collected on the geological exploration of the 40th parallel under Clarence King. Watson brought together the American-occurring species, which had previously been placed under genera as *Salsola*, *Chenopodium*, *Schoberia*, and *Chenopodina*. John Torrey (1828, 1843, 1853, 1857) was one of the first American botanists to examine plants collected from western America. He apparently found plants of *Suaeda* which did not exactly fit the existing species' descriptions. Watson resolved the problem somewhat by describing new species of *Suaeda*, including *S. depressa*, *S. torreyana*, *S. diffusa*, *S. suffrutescens*, *S. californica*, and *S. occidentalis*. He also named *S. linearis* var. *ramosa* of northeastern America.

In 1907 M. L. Fernald published a work on northeastern American *Suaeda*, including *S. maritima*, *S. linearis* var. *ramosa*, and two new species, *S. richii*, and *S. americana*.

Major changes in the taxonomy of the genus occurred in 1916 with Paul C. Standley's work on Chenopodiales. He recognized 20 species of *Dondia*,

including *D. minutiflora*, named by Watson in 1883 (as a species of *Suaeda*), *D. insularis* Britton (1906), and eight new species that he named: *D. nigra*, *D. fernaldii*, *D. mexicana*, *D. ramosissima*, *D. palmeri*, *D. taxifolia*, *D. tampicensis*, and *D. brevifolia*.

Three new species and two varieties from Texas and Mexico were added in 1943 by I. M. Johnston: *S. jacoensis*, *S. nigrescens*, *S. nigrescens* var. *glabra*, *S. suffrutescens* var. *detonsa*, and *S. duripes*. Recent floristic works (e.g. Correll and Johnston [1970], Fernald [1952], Gleason [1952], Hitchcock et al. [1969], Lundell [1969], and Munz [1974]) have included the above species, with some lowered to the varietal level or included in synonymy.

Trends in morphology and distribution of the more than 100 species of *Suaeda* were examined on a world-wide basis by Iljin (1936) who believed the genus to have originated not later than by the beginning of the Cretaceous period. Iljin published a map of the range of *Suaeda* showing the cosmopolitan nature of its distribution, plus a discussion of his seven sections based upon stigma types. Three of those sections (*Platystigma*, *Heterosperma*, and *Limbogermen*) can be distinguished among North American species of *Suaeda*.

The present treatment is based upon our examination of North American specimens of *Suaeda* from the following herbaria: A, CSULA, DAV, F, GH, MO, MU, NY, OSU, TEX, UC, UC-JEP, US, and UT. Several Old World specimens were also examined from F, GH, MO, NY, and US. Curators of these herbaria are gratefully acknowledged for loans of specimens. We are also deeply appreciative of the loan of specimens, slides, and information on personal observations receive from Dr. James Henrickson of California State University at Los Angeles. Personal collections from northern California and southern Oregon are deposited at MU.

Following the species description is a citation of one specimen per county or district recorded which displays mature floral and vegetative characteristics. Measurements and other data given in the descriptions and key are based primarily upon dried specimens. Unless otherwise noted, all type specimens seen are indicated.

GENERIC DESCRIPTION

Annual or perennial herbs, or suffrutescens perennials, more or less fleshy, glabrous to short pubescent; leaves alternate, narrow and often terete, never spine-tipped; flowers bisexual or unisexual (the plants sometimes monoecious or polygamous), sessile, in clusters of (1-) 3 (-9) in the upper axils; bracts usually 3, scarious; calyx 5-cleft more than halfway to the base, the lobes narrow, keeled (carinate), transversely winged, or rounded on the back, sometimes thickly hooded (cucullate) at the apex, or horned (corniculate); stamens 5, the short filaments usually exerted at maturity; ovary subglobose or depressed, one-celled, the ovule solitary, basal, the styles (2-) 3; utricle enclosed by the infolding sepals, pericarp usually free from seed; seed horizontal or vertical; endosperm scanty or none; embryo coiled in a flat spiral.

SPECIES OF *SUAEDA* IN NORTH AMERICA

- A. Glabrous herbaceous annuals or perennials; mature sepals thin, rounded and sometimes inflated vertically and basally; if inflated, sepals may dry with sharply pointed apical horns (corniculate), rounded hoods, vertical keels and/or transverse wings at the base.
- B. One or all sepals sharply pointed or corniculate, sometimes with transverse wing development.
- C. One or two sepals sharply pointed; along north Atlantic Coast.
1. *S. americana*
- C. All sepals sharply pointed and/or transversely winged; interior western U.S.
- D. Sepals transversely winged and corniculate; leaves narrow at base; flowers and leaves not crowded; stems thin and flexuous.
7. *S. occidentalis*
- D. Sepals usually not transversely winged, but corniculate; leaves broadest at base; flowers usually in dense terminal inflorescences; branches stout.
- E. Seeds 1.0-1.3 mm. broad; primarily of interior western American plains 5. *S. depressa*
- E. Seeds generally larger (1.2-2.0 mm. broad); plants of inland and south central California 6. *S. depressa* var. *erecta*
- B. Sepals rounded, may be carinate (keeled) and/or develop transverse wing when greatly inflated to the base of the sepal.
- F. Sepals rounded, not usually carinate; branches decumbent; flowers in few-flowered glomerules along stem.
- G. Seeds 1.8-2.0 mm. broad; leaves glaucous, acute, 0.5-5.0 cm. long; sepals rounded, may be obscurely carinate; Atlantic Coast and coastal Europe 2. *S. maritima*
- G. Seeds 1.25-1.50 mm. broad; leaves dark-green, blunt-tipped, 0.3-1.5 cm. long; sepals rounded, not carinate; along north Atlantic Coast of America 3. *S. richii*
- F. Sepals rounded and carinate, may also be transversely inflated or winged at the base; branches erect; flowers in panicles or subspicate inflorescences.
- H. Sepals narrowly and evenly carinate, drying with the keel not unevenly crispate nor transversely winged; leaves linear, acute, not acuminate nor apiculate; along Atlantic Coast, Gulf of Mexico, West Indies 4. *S. linearis*
- H. Sepals broadly inflated, prolonged off obliquely at base, drying with transverse wing and/or crispate keel; leaves acuminate or apiculate; primarily of north central Mexico.
- I. Plants branching from the base, 3-12 dm. tall; leaves not opposite, 1-4 cm. long, acuminate or apiculate; sepals not irregularly crispate on keel, nor developing corky-thickened appendages on keel or wing; seed ca. 0.8 mm. broad; plants of northern and central Mexico 16. *S. mexicana*
- I. Plants not branching conspicuously at the base, 1-3 dm. tall; lower leaves opposite, 1-2 cm. long, apex obtuse, apiculate; sepals irregularly crispate on keel, often also transversely winged and developing corky-thickened appendages; seed 1.1-1.3 mm. broad; endemic on salt flats at south end of Lake Jaco, Coahuila, Mexico 17. *S. jacoensis*

- A. Woody-based (suffrutescent) perennials, glabrous or pubescent; sepals cucullate (usually thickest at apex and broadly rounded over seed, not corniculate nor carinate).
- J. Plants pubescent through maturity, although calyx or leaves may not be.
- K. Calyx nearly or quite glabrous.
- L. Flowers 1-3 per axil; leaves glaucous, rounded at apex, 0.3-0.7 cm. long; plants may become completely glabrous with age; seed ca. 1.5 mm. broad. (See also under lead Q) 13. *S. palmeri*
- L. Flowers 3-9 per axil; leaves green, acute, 0.3-1.3 cm. long; leaves may not remain pubescent; seed less than 1.5 mm. broad.
- M. Flowers 1.5-2.0 mm. broad, globose-obovoid; stem pubescent; seed ca. 1.0 mm. broad; along coast of southern Texas and eastern Mexico 18. *S. tampicensis*
- M. Flowers 1.0-1.5 mm. broad, globose; leaves and stem pubescent; seed ca. 0.7 mm. broad; southwestern U.S. and northwestern Mexico 15. *S. suffrutescens* var. *detonsa*
- K. Entire plant, including calyx and leaves, pubescent.
- N. Pubescence short; branches of inflorescence slender, spreading and flexuous; leaves linear, contracted at base, not crowded; flowers 1-3 per axil 9. *S. torreyana* var. *ramosissima*
- N. Pubescence tomentulose or villous; branches stout, erect; leaves not contracted at base, crowded, or if not, flowers 3-9 per axil.
- O. Flowers 2.5-3.0 mm. broad, 1-2 per axil; leaves 1.0-2.5 cm. long, acute, leaving prominent knobby leaf bases. 11. *S. californica* var. *taxifolia*
- O. Flowers 1-2 mm. broad, more than 2 per axil; leaves 0.3-1.3 cm. long, may leave knobby leaf bases.
- P. Leaves 0.3-0.8 cm. long, obtuse or rounded apex, crowded, leaving prominent knobby leaf bases; flowers 1-3 per axil; coastal California and Lower California, Mexico. 12. *S. californica* var. *pubescens*
- P. Leaves 0.5-1.3 cm. long, acute, not crowded, reduced in the inflorescence, not leaving prominent knobby leaf bases; flowers 3-9 per axil, many staminate; southwestern U.S. and northern Mexico 14. *S. suffrutescens*
- J. Plants glabrous when mature, or glaucous.
- Q. Leaves 1.0 cm. or longer, acute, green.
- R. Plants densely leafy, branches stout; leaves lanceolate, 1.5-3.0 cm. long; leaving prominent knobby leaf bases; flowers 2-3 mm. broad, 1-2 per axil; seed 1.5-2.0 mm. broad. 10. *S. californica*
- R. Plants not densely leafy, branches more slender and flexuous; leaves linear, acute, often reduced in inflorescence, contracted at the base, not leaving prominent knobby leaf bases; flowers 1.0-1.5 mm. broad, usually 3 per axil; seed 0.8-1.5 mm. broad. 8. *S. torreyana*
- Q. Leaves 0.2-0.8 cm. long, rounded at apex, glaucous.
- S. Plants entirely glabrous, glaucous; seed ca. 1.0 mm. broad; along Atlantic Coast of Texas and Mexico, West Indies. 19. *S. conferta*
- S. Plants pubescent with glabrous calyx when young, may become completely glabrous; seed ca. 1.5 mm. broad; north central Mexico. 13. *S. palmeri*

1. *SUAEDA AMERICANA* (Pers.) Fernald, *Rhodora* 9: 146. 1907.*Salsola salsa* β *americana* Pers., *Syn. Pl.* 1: 296. 1805.*Chenopodium salsum* β *americanum* (Pers.) Roem. and Schult., *Syst. Veg.* 6: 270. 1820.

Decumbent annual, glabrous; branches 2-3 dm. long, only the abundant flowering ones ascending; leaves green, becoming red as the plant matures in autumn; lower leaves linear, acute, to 2.0 cm. long, shorter and broader in the inflorescence; flowers in dense subspicate inflorescences, generally having an irregular calyx with one or two of the sepals more strongly hooded and corniculate than the others, occasionally with development of transverse wing at the base; seed horizontal, 1.0-1.5 mm. broad, black at maturity.

Type: From the lower St. Lawrence River, *Michaux s.n.* (Paris, Photo-type!).

Matted sea-blite, American seepweed.

Occurs in salt marshes along the Atlantic Coast, Nova Scotia to New Jersey. Plants mature in late August to November.

TYPIFICATION: The type specimen, described by Michaux in 1803 as *Salsola salsa* ? L., was collected by Michaux at the mouth of the St. Lawrence River and examined by Fernald (1907) in the summer of 1903, at which time he noted:

Loosely branching *Suaeda*, very immature, but from the crowding of the flowers seems to be the same as the Norwood Cove and Wells Beach (Maine) species of late September and October . . . This plant of Norwood Cove and Wells Beach is well characterized not only by its late fruiting and sub-prostrate habit but by its densely crowded flowers on spiciform branches, its very irregular calyx, and its rich claret-color in autumn; and it is apparently the plant intended by Persoon as *Salsola salsa*, var. ? *americana*.

In Michaux's 1803 publication he questionably identified the specimen from the St. Lawrence River as *Salsola salsa* L. and made the observation that it differed from the typical plant of Linnaeus in its low, subdecumbent habit with dense clusters of flowers. This was also the notation made by Persoon when he renamed the specimen var. ? *americana* in 1805.

Watson (1874) included *Salsola salsa* sensu Michaux, from the mouth of the St. Lawrence River, as a synonym under his *Suaeda linearis* var. *ramosa*. This had been treated as a synonym by Moquin-Tandon, and others, who doubtfully placed it under the more southern *S. linearis*. Fernald's exploration of the coast of Maine, and the lower St. Lawrence valley, and our examination of herbarium specimens, have shown that the tall, small-seeded *S. linearis* does not occur in central and northern Maine, nor the maritime provinces of Canada. We have found that typical *S. linearis* rarely occurs further north than New York, and in that state *S. linearis* and *S. americana* were often difficult to separate.

Britton apparently misapplied Persoon's name to the southern erect plant (*S. linearis*) under his combination *Dondia americana* (Pers.) Britton in 1896. Fernald was apparently correct in redefining the subdecumbent spiciform plant of the American North Atlantic coast as a new species of *Suaeda* through elevation of Persoon's variety and in employing the type and description referred to by Persoon.

SPECIMENS EXAMINED: CANADA, PRINCE EDWARD ISLAND: Prince Co.: Cape Aylesbury, Fernald, Long and St. John 7416, Aug. 29, 1912 (F, GH, MO, NY, UC). NEW BRUNSWICK: Gloucester Co.: Shippigan I., Blake 5541, Aug. 26, 1913 (GH, US). Kent Co.: Richibucto, Blake 5716, Sept. 22, 1913 (GH). Northumberland Co.: Fox I., Blake 5694, Sept. 18, 1913 (GH, US). Westmoreland Co.: Moncton, Svenson and Fassett 1092, Aug. 21, 1923 (GH). NOVA SCOTIA: Colchester Co.: mouth of Salmon R., Truro, Fernald and Wiegand 3323, Sept. 11, 1910 (GH). QUEBEC: Bonaventure, Marie-Victorin, Rolland-Germain and Jacques 33348, Aug. 13, 1930 (GH, NY). River du Loup Co.: Isle Verte, Lepage 13975, Sept. 2, 1957 (GH, US).

UNITED STATES, MAINE: Norwood Cove, Fernald s.n., Sept. 18, 1892 (GH). York Co.: Wells Beach, Furbish s.n., Sept. 1898 (GH). Hancock Co.: Great Cranberry I., Williams s.n., Aug. 8, 1910 (GH). NEW HAMPSHIRE: Rockingham Co.: Rye, Rich s.n., Sept. 19, 1901 (GH). CONNECTICUT: Fairfield Co.: Stratford, Eames s.n., Aug. 22, 1893 (NY, US). New Haven Co.: New Haven, Cowles s.n., Aug. 12, 1892 (MU). MASSACHUSETTS: Nantucket Co.: Nantucket I., Bicknell s.n., Sept. 11, 1907 (NY). Dukes Co.: Martha's Vineyard, Bicknell 4023, Sept. 29, 1929 (NY). Middlesex Co.: Cambridge, Churchill s.n., Aug. 27, 1912 (MO). Essex Co.: Lynn, Morong s.n., Sept. 7, 1875 (MO, NY). Suffolk Co.: S. Boston, Dean s.n., Oct. 4, 1909 (GH). Barnstable Co.: Barnstable Harbor, Yarmouth, Fernald 452, Sept. 7, 1928 (F, GH, MO, NY, TEX, UC, US). Bristol Co.: Swansea, Touisset, Deane and Rand s.n., Sept. 25, 1909 (GH). Plymouth Co.: Hingham Bridge, Forbes s.n., Oct. 6, 1907 (TEX, UC). RHODE ISLAND: Newport Co.: Tiverton, Greenman 1729, Sept. 27, 1903 (GH, MO). NEW YORK: Richmond Co.: Staten I., Kearney s.n., Oct. 8, 1893 (NY). Suffolk Co.: Aquebogue, Long I., Young s.n., Sept. 1873 (F, NY, US). Brooklyn Co.: Barren I., Brooklyn, Svenson 8237, Oct. 26, 1936 (MO). NEW JERSEY: Atlantic Co.: Atlantic City, Brinton s.n., Sept. 25, 1887 (F, MO). Essex Co.: Newark Bay, Edwards s.n., Sept. 3, 1939 (NY). Cape May Co.: Cape May, Witte s.n., Sept. 20, 1930 (NY). Ocean Co.: Pt. Pleasant, Mackenzie 4819, Oct. 2, 1910 (NY). Monmouth Co.: Keansburg, Mackenzie 4480, Sept. 26, 1909 (MO, NY).

2. *SUAEDA MARITIMA* (L.) Dumort., Fl. Belg. 22. 1827.

Chenopodium maritimum L., Sp. Pl. 221. 1753.

Atriplex maritima (L.) Crantz, Inst. 1: 208. 1766.

Salsola maritima (L.) Poir. in Lam., Encyc. 7: 291. 1806.

Schoberia maritima (L.) C. A. Meyer in Ledeb., Fl. Alt. 1: 400. 1829.

Chenopodina maritima (L.) Moq. in DC., Prodr. 13(2): 161. 1849.

Schoberia linifolia Nutt. ex. Moq. in DC., Prodr. 13(2): 161. 1849, as synonym.

Chenopodina maritima α *vulgaris* Moq. in DC., Prodr. 13(2): 161. 1849.

Lerchea maritima (L.) Kuntze, Rev. Gen. 549. 1891.

Dondia maritima (L.) Druce, Ann. Scot. Nat. Hist. 42. 1896.

Erect or decumbent annual (more robust than *S. richii*), 0.5-5.0 dm. tall;

leaves glaucous, linear, acute, semiterete, 0.5-3.0 (-5.0) cm. long, those of the inflorescence shorter yet much exceeding the 1-3 (-4) axillary flowers; sepals pale-green, rounded or obscurely carinate; seed 1.8-2.0 mm. broad, red-brown to black at maturity.

Type locality: Seashores of Europe. Type material at Linnaean Herbarium and at British Museum of Natural History, not seen (phototype GH!).

White sea-blite.

Coastal, mostly growing in wet salt marshes, high tidal beaches or mud flats, Quebec to Florida, and coastal Europe.

SPECIMENS EXAMINED: CANADA, PRINCE EDWARD ISLAND: Souris R., *Marie-Victorin* 9907, Aug. 20, 1919 (F, GH, NY, US). *Queens Co.*: Rocky Point, *Fernald, Long and St. John* 7414, Aug. 31, 1912 (GH). *Prince Co.*: Summerside, *Fernald, Long and St. John* 7412, Aug. 7, 1912 (GH, US). NEW BRUNSWICK: *Charloite Co.*: Grand Manan, *Weatherby and Weatherby* 7315, Aug. 14, 1944 (GH, NY, US). *Westmoreland Co.*: Moncton, *Blake* 5739, Sept. 30, 1913 (GH, NY, US). NOVA SCOTIA: *Lunenburg Co.*: Crescent Beach, *Zinck* 1124, Aug. 29, 1941 (F). *Shelburne Co.*: Villagedale, *Fernald, Long and Linder* 21165, Aug. 7, 1920 (GH). *Halifax Co.*: Purcell's Cove, Halifax Harbor, *Howe and Lang* 1572, Sept. 2, 1901 (GH, NY). *Yarmouth Co.*: *Fernald, Long and Linder* 21170, Sept. 7, 1920 (GH). *Digby Co.*: Digby, *Macoun* 83976, Aug. 26, 1910 (GH). *Annapolis Co.*: Annapolis Royal, *Fernald* 2620, Sept. 4, 1932 (GH). *Cape Breton Co.*: Cape Breton I., *Nichols* 1585, July 15, 1915 (GH). *Kings Co.*: Port Williams, *Fernald s.n.*, Aug. 23, 1902 (GH). QUEBEC: *Carlton Co.*: Bonaventure, *Marie-Victorin, Rolland-Germain and Jacques* 33318, Aug. 12, 1930 (GH, MU, NY).

UNITED STATES, MAINE: *Washington Co.*: Kelly Point, Pembroke, *Fernald* 1744, July 21, 1909 (US). *York Co.*: Old Orchard Beach, Ocean Park, *Wells s.n.*, Oct. 12, 1968 (MU). *Knox Co.*: Gleneove, *Friesner* 6188, Aug. 10, 1933 (MU, TEX, UC, UT). *Lincoln Co.*: Penobscot Bay, *Steyermark* 2178, July 25, 1930 (F). PENNSYLVANIA: Greenwich Pt., Philadelphia, *Parker s.n.*, Sept. 9, 1874 (MO, NY). MASSACHUSETTS: *Norfolk Co.*: Hingham, *Churchill s.n.*, Oct. 6, 1888 (MO). *Essex Co.*: *Essex, Knowlton s.n.*, Sept. 20, 1908 (UC). *Suffolk Co.*: Oak Island, Revere, *Brooks* 1051, Sept. 11, 1912 (UC). *Barnstable Co.*: Woods Hole, *Peters s.n.*, Aug. 1884 (NY). NEW HAMPSHIRE: *Stratford Co.*: cobble beach, Colony Cove, Durham Pt., Durham, *Hogdon, Smith and Smith* 1137, Sept. 13, 1941 (GH, MO, NY, OSU, TEX, UC, US). *Rockingham Co.*: Hampton, *Robinson* 752, Sept. 22, 1901 (F, GH). RHODE ISLAND: *Providence Co.*: Pautucket Neck, *Collins and Chamberlain s.n.*, Oct. 21, 1899 (GH, US). CONNECTICUT: *Fairfield Co.*: Housatonic R., *Eames* 72, Sept. 11, 1898 (GH). *New Haven Co.*: Milford, *Harger s.n.*, Aug. 20, 1900 (GH). NEW YORK: *Richmond Co.*: Prince's Bay, Staten I., *Kearney s.n.*, Oct. 6, 1894 (F, NY, US). *Nassau Co.*: Long I., *Muenschler and Curtis* 6123, Sept. 1, 1938 (US). *Suffolk Co.*: Huntington, *Muenschler and Curtis* 6118, Aug. 30, 1938 (GH). NEW JERSEY: *Ocean Co.*: Ocean City, *Benner s.n.*, Sept. 13, 1912 (GH). VIRGINIA: Ft. Monroe, *Vasey s.n.*, 1879 (MO). FLORIDA: *Wakulla Co.*: St. Marks Wildlife Refuge, *Godfrey* 60361, Sept. 30, 1960 (GH, NY, UC). *Hillsborough Co.*: 12 mi. n.w. Tampa, Double Branch Bay, *Ray and Lakela* 11122, July 15, 1962 (GH).

3. SUAEDA RICHII Fernald, *Rhodora* 9: 145. 1907.

Dondia richii (Fernald) A. Heller, *Muhlenbergia* 6: 83. 1910.

Decumbent annual, in mats 1-5 dm. in diameter; leaves dark-green, not glaucous, linear to linear-oblong, blunt, subterete, dorsally compressed, the lower leaves to 1.5 cm. long, those subtending fascicles of flowers broader and shorter (0.3-0.5 cm. long); sepals rounded on back, not carinate; seeds black at maturity, 1.25-1.50 mm. broad.

Type collection: Wells Beach, York Co., Maine, *J. C. Parlin and M. L. Fernald s.n.*, July 23, 1898 (US #1086836 !).

Rich's sea-blite.

Occurs in salt marshes along North Atlantic Coast, Newfoundland to Massachusetts.

SPECIMENS EXAMINED: CANADA, PRINCE EDWARD ISLAND: Tracadie Beach, *Churchill s.n.*, July 31, 1901 (MO). NEWFOUNDLAND: Avalon Peninsula, *Fernald, Long and Dunbar 26645*, Aug. 26, 1924 (GH). NOVA SCOTIA: Lehave R., *Macoun 83977*, Aug. 6, 1910 (F, GH). *Picton Co.*: Loch Broom, *Robinson 153*, Aug. 21, 1905 (NY).

UNITED STATES, MAINE: *York Co.*: Wells, *Deane 207*, Sept. 28, 1907 (F, GH, MO, NY, TEX, UC, US).

4. *SUAEDA LINEARIS* (ELL.) Moq., *Chenop. Enum.* 130. 1840.

Chenopodium maritima Pursh, *Fl.* 198. 1814, not L.

Salsola linearis (ELL.) Sk. 1: 332. 1817.

Suaeda maritima Torr., *Fl. N. Y.* 2: 141. 1843, not Dumort.

Chenopodina linearis (ELL.) Moq. in DC., *Prodr.* 13(2): 164. 1849.

Chenopodina maritima Gray, *Man. ed.* 2. 366. 1856, not Moq.

Suaeda linearis (ELL.) Wats., *Proc. Amer. Acad. Arts Sci.* 9: 87. 1874, in part.

Suaeda linearis var. *ramosa* Wats., *Proc. Amer. Acad. Arts Sci.* 9: 87. 1874, excl. syn. *Salsola salsa* Michx. and *S. salsa* var. *americana* Pers.

Dondia americana (Pers.) Britton in Britton and Brown, *Ill. Fl.* 1: 584. t. 1393. 1896, excl. syn. *Salsola salsa* var. *americana* Pers.

Dondia linearis (ELL.) Heller, *Cat. N. Amer. Pl.* 3. 1898.

Dondia carinata Millsp., *Field Columb. Mus. Publ. Bot.* 2: 297. 1909. (Type: New Providence, Bahamas, *Northrop 150*, Jan. 1890, NY, not seen. Isotype, *Northrop 194*, NY!).

Erect or ascending annual, sometimes persisting in warm regions, 2-9 dm. high, profusely branched, the slender branches ascending or spreading, not decumbent; leaves narrowly linear, acute, not glaucous, dark-green, to 4 cm. long, shorter in slender elongated flowering branches; inflorescence usually a short, loose panicle; sepals equally carinate; seed black, 1.0-1.5 mm. broad.

Type: S. Carolina, as "*Chenopodium maritimum* Walt. Jul-Sept. in *scirpetis maritimis*", *Walter s.n.* (CHARL, not seen; phototype US!)

Southern sea-blite.

Occurs along the Atlantic Coast, New York to Yucatan peninsula of Mexico, and West Indies.

SPECIMENS EXAMINED: NEW YORK: *Kings Co.*: Bergen Beach, *Svenson 6365*, Sept. 28, 1934 (GH, MO, UC). *Suffolk Co.*: Southampton, Long

I., *Clute 309*, Sept. 3, 1898 (NY). NEW JERSEY: *Cape May Co.*: Cape May, *Witte s.n.*, Sept. 28, 1930 (NY). *Atlantic Co.*: Brigantine Beach, *Fogg 9535*, Aug. 26, 1935 (F). PENNSYLVANIA: Greenwich Point, Philadelphia, *Parker s.n.*, Sept. 9, 1874 (GH, MO, NY). NORTH CAROLINA: *Carteret Co.*: Swansboro, *Wood 6383*, July 28, 1946 (GH) *Dare Co.*: Hatteras, *Radford, Haeslop and Miller 7616*, Aug. 27, 1953 (GH). SOUTH CAROLINA: *Beaufort Co.*: Hunting I., *Bell 4776*, Sept. 6, 1956 (GH). *Georgetown Co.*: Georgetown, *Harris C19629*, July 28, 1919 (US). GEORGIA: *McIntosh Co.*: Sapelo I., *Duncan 20565*, Sept. 19, 1956 (F, GH, US). *Chatham Co.*: Tybee I., *Harper 747*, Sept. 29, 1900 (NY, US). FLORIDA: *Lee Co.*: Sanibel I., *Tracy 7624*, May 18, 1905 (F, GH, MO, NY, US). *Dade Co.*: Matheson Hammock, *Hawkes s.n.*, Sept. 18, 1947 (UC). *Brevard Co.*: Titusville, *Nash 2310*, July 30, 1895 (F, GH, MO, NY, US). *Pinellas Co.*: Long Key, *Thorne 9412*, Dec. 21, 1949 (UC). *Indian River Co.*: Vero Beach, *Lemaire 192*, Apr. 6, 1957 (GH). *Collier Co.*: Cape Roman, *Lakela and Barilotti 31047*, Aug. 16, 1967 (GH). *Franklin Co.*: Alligator Harbor, *Kral 2784*, July 18, 1956 (GH, NY). *Sarasota Co.*: Sarasota Bay, *Perkins s.n.*, Dec. 14, 1942 (GH). *Wakulla Co.*: St. Mark's Wildlife Refuge, *Godfrey and Kral 54106*, Oct. 6, 1955 (GH, NY). *Monroe Co.*: Saddlebunch Key, *Moldenke 813*, Mar. 20, 1930 (MO, MU, NY). ALABAMA: *Mobile Co.*: Mon Luis I., *Mohr s.n.*, July 1867 (F, US). LOUISIANA: *Plaquemines Parish*: Breton I., *Tracy and Lloyd 492*, Aug. 18, 1900 (F, MO, NY, US). *Cameron Parish*: Cameron, *Cocks 1724*, Sept. 1906 (GH). *Terrebonne Parish*: Timbalier I., *Wurzlow s.n.*, July 25, 1914 (NY). TEXAS: *Cameron Co.*: 14 mi. from Pt. Isabel, Brownsville Road, *Ferris and Duncan 3085*, Aug. 1, 1921 (MO, NY). *Kenedy Co.*: El Toro I., *Tharp 49290*, June 16, 1949 (MO, NY, TEX, UC, US). *Willacy Co.*: Red Fish Bay, *Cory s.n.*, Nov. 16, 1940 (GH). *Galveston Co.*: Galveston Bay, *Lindheimer s.n.*, July-Aug. 1892 (GH, MO). *San Patricio Co.*: Ingleside, *Cory 45323*, July 25, 1944 (TEX). *Jefferson Co.*: 8 mi. west of Sabine Pass, *Cory 11056*, Oct. 5, 1934 (GH). *Brooks Co.*: Fallurgias, *Imes 317*, Nov. 23, 1941 (GH). *Cathoun Co.*: Port Lavaca, *Gentry 37*, Aug. 3, 1946 (F, GH, TEX). *Nueces Co.*: Mustang I., *Imes 378*, Nov. 29, 1940 (GH). *Brazoria Co.*: Brazoria Nat'l Wildlife Refuge, Canal, *Fleetwood 9078*, July 20, 1967 (TEX). *Hidalgo Co.*: East Donna, *Whitehouse 44238*, Aug. 20, 1944 (GH). *Pecos Co.*: E. Escondido Spr., *Tharp and Baker 3*, Sept. 29, 1943 (as *S. Tharpü*) (F, MO, TEX, UC, US).

BAHAMAS: Red Bay, Andros, *Northrop and Northrop 455*, Apr. 15, 1890 (F, GH, NY). North Bimini, *Howard and Howard 9990*, May 1948 (GH, NY). Eleuthera, Rock Sound, *Britton and Millsbaugh 5563*, Feb. 21, 1907 (F, NY).

HAITI: Haiti, *Ekman 9886*, Apr. 25, 1928 (GH).

CUBA: Havana, *Baker 1406*, Aug. 26, 1904 (GH, NY). Salina de la Principal, Cayo Romano, Camaguey, *Shafer 2629*, Oct. 20, 1909 (F, GH, NY, US).

YUCATAN PENINSULA: Yaxactun, *Gaumer 23253*, March 1916 (F, GH, MO, NY, US). Chichankanab, *Gaumer 2219*, 1916 (F, GH, MO, UC, US). Celestun, *Schott 398*, May 12, 1865 (F). Progreso, *Steere 3090*, Aug. 11, 1932 (F).

5. SUAEDA DEPRESSA (Pursh) Wats., Bot. King's Expl. 294. 1871.

Salsola depressa Pursh, Fl. Amer. Sept. 197. 1814.

Chenopodium americanum (Pers.) Spreng., Syst. Veg. 1: 922. 1825, excl. first syn.

Chenopodium calceoliforme Hook., Fl. Bor. Amer. 2: 126. 1838 (Type: "About Carlton House Fort", *T. Drummond s.n.*, NY!).

Suaeda calceoliformis (Hook.) Moq., Chen. Enum. 128. 1840.

Chenopodina depressa (Pursh) Moq. in DC., Prodr. 13(2): 164. 1849.

Schoberia americana (Pers.) C. A. Meyer in Ledeb., Fl. Alt. 1: 402. 1829, as synonym.

Suaeda plattensis Nutt. ex Moq. in DC., Prodr. 13(2): 164. 1849. (Type: "Volcanic plains of the Missouri, Nuttall s.n., not seen, description taken as type, PH or BM?).

Schoberia calceoliformis (Hook.) Moq. in DC., Prodr. 13(2): 166. 1849.

Lerchea calceoliformis (Hook.) Kuntze, Rev. Gen. Pl. 549. 1891.

Dondia depressa (Pursh) Britt. in Britt. and Brown, Ill. Fl. 1: 585. 1896.

Dondia calceoliformis (Hook.) Rydb., Bull. Torrey Bot. Club 39: 313. 1912.

Glabrous, simple to (more commonly) freely branched, procumbent to erect annual up to 8 dm. tall; leaves linear, mostly 1-3 (-4) cm. long, semiterete, reduced greatly in the inflorescence (where the leaves are mostly 2-3 mm. long), ovate to broadly lanceolate, usually somewhat broader than the lower leaves and sometimes hiding the flowers; spikes slender; flowers congested, 3-7 per axil in an often narrow panicle or in narrow stout spikes arising along the main branches most of their distance; sepals distinctly unequal, about 1.5 mm. long, all strongly hooded, often corniculate or corrugate-corniculate transversely upon drying; seed horizontal, about 1.0-1.3 mm. broad.

Type locality: 'On the volcanic plains of the Missouri River,' Nuttall s.n. (PH or BM ?, not seen).

Pahute weed, Pursh's sea-blite, Pursh's seepweed.

Occurs on usually highly saline or alkaline soil, Alaska and Yukon, south into California, east of Cascades in Washington to Saskatchewan, Minnesota to Texas. Matures in July to September.

TYPIFICATION: The Nuttall specimen was not located, but most of those cited by Watson (1871) were seen, which included many plants collected on the American plains and very closely resembled descriptions by Pursh and Hooker.

All plants previously called *S. depressa* var. *erecta* were placed under the name *S. depressa*, with the exception of the California specimens noted under the treatment of *S. depressa* var. *erecta*. The varietal designation is retained for those plants because of their strictly erect habit, simple stems, and strict narrow inflorescences enclosed by the long, lanceolate leaves which allow a collector to distinguish them from typical *S. depressa*.

SPECIMENS EXAMINED: CANADA, N.W. TERRITORY: Ft. Smith, Mackenzie District, Loan 306, Aug. 21, 1950 (GH); Raup Lake, Raup 2261, Aug. 19, 1928 (GH). YUKON TERRITORY: Tagish, Calder 28347, Aug. 17, 1960 (UC). SASKATCHEWAN: Round Lake Valley, Macoun and Herriot 76792, Aug. 6, 1906 (GH, MO, NY). ALBERTA: Rosedale, Moodie 1212, Aug. 18, 1915 (F, GH, MO, NY). CRAIGMYLE DISTRICT, Brinkman 735, July 17, 1922 (GH). BRITISH COLUMBIA: Peace R. District, Bear L., Groh 893, Sept. 11, 1939 (UC); Richter Pass, Osoyoos, McCabe 4625, Aug. 30, 1937 (UC); Queen Charlotte I., Calder and Taylor 35938, July 14, 1964 (GH, MO, UC). MANITOBA: Winnipeg, Macoun 12866, Aug. 12, 1896 (NY); Carroll, Sem and Gordon 3131, Aug. 21, 1946 (MO).

UNITED STATES, ALASKA: Kenai Peninsula, *Calder 6681*, Aug. 13, 1951 (UC); Anchorage, *Murie s.n.*, Aug. 2, 1922 (US). MINNESOTA: *Clay Co.*: Barnesville, *Moore 23639*, Sept. 25, 1957 (US). *Kitson Co.*: Clow Township, *Moore and Moore 11576*, Aug. 9, 1939 (GH). *Lac Que Parle Co.*: Odessa, *Gleason 9398*, July 13, 1940 (NY). MISSOURI: Sheffield (introduced), *Bush 3885*, May 23, 1906 (GH, NY). NEBRASKA: *Lancaster Co.*: near Horse Cr., *Scotts Bluff, Rydberg 327*, Aug. 1, 1891 (NY, US). *Kearney Co.*: Mindon, *Hopeman 900*, Aug. 1895 (GH, US). *Dawson Co.*: Lexington, *Bates 4762*, Oct. 11, 1908 (GH). KANSAS: *Republic Co.*: salt marsh, Sect. 29, T4S, R2W, *Morley 1002*, Sept. 5, 1960 (NY, UC). *Barber Co.*: Hazellon, *McGregor 15088*, Aug. 31, 1959 (US). *Reno Co.*: Hutchinson, *Benke 2195*, Oct. 7, 1918 (F). SOUTH DAKOTA: *Spink Co.*: Redfield, *Ricksecker 105*, Aug. 10, 1903 (MU, UC). *Roberts Co.*: flood plain, *Over 15418*, Aug. 18, 1923 (US). *Kingsbury Co.*: Iroquois, *Thornber s.n.*, Aug. 10, 1894 (GH, UC). *Butte Co.*: Newell, *Stephens 45405*, Sept. 17, 1970 (NY, UC). *Harding Co.*: Antelope Valley, *Visher 512*, Aug. 6, 1912 (F). NORTH DAKOTA: *Nelson Co.*: Petersburg, *Stephens 45188*, Sept. 13, 1970 (NY). *Lamour Co.*: Edgeley, *Moore and Moore 10074*, Aug. 11, 1937 (GH, NY, UC). *Sargent Co.*: Gwinner, *Stephens 45048*, Sept. 11, 1970 (NY). *Ward Co.*: Minot, *Rider 359*, July 30, 1896 (F). *Benson Co.*: Leeds, *Luell s.n.*, Sept. 1, 1899 (MU). *Grand Forks Co.*: Kellys Slough, Grand Forks, *Mabbott 504*, Sept. 20, 1917 (US). *Cass Co.*: Fargo, *Stevens 3044*, Sept. 4, 1967 (UC, US). *Pierce Co.*: Lake n.e. of Petrified L., *Mabbott 440*, Aug. 31, 1917 (US). *Sioux Co.*: Solen, *Stevens 1385*, Aug. 29, 1952 (UC, US). *Burleigh Co.*: McKensie Slough, Bismark, *Metcalf 351*, Aug. 24, 1917 (MO). *Mercer Co.*: Ft. Mandan, *Stevens 917*, Aug. 16, 1941 (UC, US). NEW MEXICO: *Chaves Co.*: Roswell, *Earle and Earle 311*, Aug. 19, 1900 (MO, NY, US). *San Juan Co.*: Farmington, *Standley 6896a*, July 7, 1911 (GH, NY, US). *Bernalillo Co.*: Albuquerque, *Herrick s.n.*, Sept. 13, 1894 (NY, US). TEXAS: *Wilbarger Co.*: Red River, *Ball 1231*, Sept. 1880 (F, MO). ARIZONA: *Coconino Co.*: Tuba City, *Darrow 2762*, Aug. 24, 1945 (UC). OKLAHOMA: *Cleveland Co.*: Norman, *Shead s.n.*, Sept. 17, 1954 (GH, UC). *Jackson Co.*: Altus, *Hopkins 1012*, Oct. 24, 1936 (GH, US). *Alfalfa Co.*: Salt Plains Wildlife Refuge, *Nighswonger 428*, Oct. 6, 1968 (TEX). COLORADO: *Alamosa Co.*: Alamosa, *Talbot 353*, Aug. 19, 1926 (UC). *Montrose Co.*: Montrose, *Shear 4930*, July 22, 1897 (NY, US). *Fremont Co.*: Canyon City, *Shear 3448*, Aug. 7, 1896 (NY). *Chaffee Co.*: Buena Vista, *Sheldon 255*, July 20, 1892 (US). *Larimer Co.*: Ft. Collins, *Cowen 2228*, Sept. 3, 1893 (MO, NY). *Mesa Co.*: Grand Junction, *Underwood and Selby 508*, Sept. 15, 1901 (NY). *Park Co.*: Hartsel Jct., *Weber 12930*, Aug. 11, 1965 (UT). *Gunnison Co.*: Stevens Cr., *Gunnison, Hall 251*, July 4, 1961 (UT). WYOMING: *Albany Co.*: alkali flats, Laramie, *Nelson 8677*, Sept. 1902 (F, GH, MO, NY, UC, US). *Carbon Co.*: alkali flats, Hanna, *Nelson 8161*, Aug. 31, 1900 (GH, MO, NY, US). *Sweetwater Co.*: Lost Creek, *Owney and Lang 1087*, Aug. 9, 1936 (MO). *Uinta Co.*: Ft. Bridger, *Hopeman s.n.*, Sept. 2, 1919 (MO). *Johnson Co.*: Buffalo, *Twecdy 3286*, Sept. 1900 (NY). MONTANA: *Big Horn Co.*: Crow Agency, *Hayden and Porter 67*, Aug. 8, 1871 (GH, NY). *Dawson Co.*: Colgate, near Glendive, *Sandberg 1034*, Sept. 6, 1892 (GH, NY, US). *Lewis and Clark Co.*: Helena, *Kelsey s.n.*, Sept. 21, 1891 (MU, NY). *Lake Co.*: Polson, *Umbach 260*, Aug. 19, 1901 (F, NY, US). *Philips Co.*: Malta, Alkali L., *Blankinship 126*, Aug. 24, 1890 (GH, US). *Blaine Co.*: Havre, *Muenschner 11471*, Sept. 5, 1937 (MO, NY). IDAHO: *Bear Lake Co.*: Bear Lake, *Davis 1822*, Sept. 1, 1937 (F). *Custer Co.*: May, *Hitchcock and Muhlich 11302*, Aug. 20, 1944 (NY, UC). *Owyhee Co.*: Grandview, *Davis 4232*, Aug. 19, 1941 (F, UC). *Lemhi Co.*: Salmon, *Christ 5854*, July 20, 1934 (NY).

Bannock Co.: Pocatello, *Christ* 8369, July 12, 1937 (NY). *Franklin Co.*: Preston, *Davis* 4062, Aug. 21, 1941 (F). *Bingham Co.*: Springfield, *Davis* 1493, July 29, 1939 (F, UC). *Gem Co.*: Emmett, *Christ* 8550, Aug. 6, 1937 (NY). *Payette Co.*: Falk Station, *Christ and Christ* 16862, June 14, 1947 (NY). NEVADA: *Washoe Co.*: Glendale, *Kennedy* 1952, Sept. 26, 1912 (F, GH, MO, NY, US). *Elko Co.*: Salt plains, *Hitchcock* 1123, Aug. 25, 1897 (GH, MO, NY). *Churchill Co.*: Carson Sink, *Kennedy* 1700, Oct. 1907 (F, GH, MO, NY, UC, US). *Humboldt Co.*: northern Nevada, *Griffiths and Morris s.n.*, July 1901 (NY). UTAH: *Rich Co.*: Woodruff, *Flowers* F3-33, Aug. 19, 1933 (F, UT). *Cache Co.*: *McHugh s.n.*, July 29, 1955 (NY). *Davis Co.*: Farmington Bay Refuge, *Pirani and Hobson* 14836, Sept. 18, 1936 (UC). *Box Elder Co.*: Bear R. Refuge, *Hobson* 14805, Sept. 10, 1936 (UC). *Salt Lake Co.*: State Prison, *Arnou* 3856, Sept. 30, 1973 (UT). *Millard Co.*: Scipio, *Goodding* 1506, Aug. 13, 1935 (UT). *Utah Co.*: Provo, *Galway and Harrison* 10836, Sept. 13, 1944 (F, UC). *Sanpete Co.*: Ephraim, *Eggleston* 10261, July 25, 1941 (US). *Summit Co.*: Park City, *James s.n.*, Aug. 15, 1887 (GH). *Weber Co.*: sand flat, n. of Little Mt., *Arnou* 803, Oct. 25, 1967 (UT). *Duchesne Co.*: *Duchesne, Harrison and Garrett* 8889, Sept. 2, 1938 (F, UC). *Carbon Co.*: Saline flats, *Price, Flowers* 836, Sept. 18, 1927 (UT). *Grand Co.*: Arches Nat'l Mon., *Welsh and Moore* 2722, Sept. 28, 1963 (NY). WASHINGTON: *Whatcom Co.*: Birch Bay, *Muenschel* 7753, Aug. 23 1937 (F, GH, MO, NY, US). *Grant Co.*: Soap Lake, *Eyerdam* 6365, Aug. 12, 1943 (UC). *Lincoln Co.*: Irby, *Elmer* 1241, Sept. 1898 (US). *Okanogan Co.*: alkali soil between Omak and Okanogan, *Fiker* 1425, Sept. 15, 1933 (NY, US). *Klickitat Co.*: Bingen, *Suksdorf s.n.*, Aug. 1906 (NY). *Kitsap Co.*: Keyport, *Eyerdam* 1181, Aug. 7, 1937 (MO). *Island Co.*: Coupeville, *Gardner s.n.*, 1899 (UC, UC-JEP). *Mason Co.*: Hoodspport, *Jones* 8625, Oct. 12, 1935 (GH). OREGON: *Lake Co.*: Summer L., *Thompson s.n.*, Sept. 25, 1974 (MU). *Klamath Co.*: mouth of Williamson R., *Coville* 1257, Aug. 7, 1902 (US). *Harney Co.*: Harney Valley, *Cusick* 2044, July 18, 1898 (F, GH, MO, UC, US). CALIFORNIA: *Modoc Co.*: McGinty Point, Goose Lake, *Wheeler* 3942, Sept. 4, 1935 (GH, MO, NY). *Siskiyou Co.*: Lower Klamath Lake, *Hopkins s.n.*, Sept. 2, 1974 (MU). *Mono Co.*: Bridgeport, *Nobs and Smith* 1691, Aug. 31, 1949 (NY, UC). *Santa Cruz Co.*: San Juan Bautista, *Belshaw* 2199, May 22, 1936 (UC). *Santa Barbara Co.*: Carpinteria, *Pollard s.n.*, Sept. 9, 1964 (TEX). *Ventura Co.*: Oxnard, *Davy* 7788, 1901 (UC). *Santa Clara Co.*: Milpitas, *McMinn* 117, Sept. 20, 1924 (UC). *Inyo Co.*: Death Valley, Ash Meadows Road, *Roos and Roos* 6236, Sept. 14, 1954 (UT). *Lassen Co.*: Honey Lake Valley, *Davy* 3350, June 17, 1897 (UC).

6. *SUAEDA DEPRESSA* var. *ERECTA* Wats., Proc. Amer. Acad. Arts Sci. 9: 90. 1874.

Suaeda minutiflora Wats., Proc. Amer. Acad. Arts Sci. 18: 194. 1883.

(Type coll.: Santa Barbara, Calif., *Cooper s.n.*, 1879, GH!).

Dondia minutiflora (Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.

Dondia depressa var. *erecta* (Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.

Dondia erecta (Wats.) A. Nels., Bot. Gaz. 34: 364. 1902.

Suaeda erecta (Wats.) A. Nels. in Coult. and Nels., Man. Bot. Rocky Mts. 169. 1909.

Glabrous, 3-7 dm. high, the branches mostly simple below, erect; leaves linear or lance-linear, broadest at base, 1.5-4.0 cm. long; inflorescence leaves shorter and broader at base; inflorescence branches stout, short and erect, mostly crowded; flowers clustered in axils; sepals irregularly

corniculate, strongly hooded; seed black, 1.2-2.0 mm. broad.

Type: Santa Barbara, Calif., *E. Cooper s.n.*, 1879 (GH!).

Occurs in inland areas of central and southern California.

SPECIMENS EXAMINED: CALIFORNIA: *Santa Barbara Co.*: Santa Barbara, *Pollard s.n.*, Oct. 8, 1957 (NY, UC). *Los Angeles Co.*: Los Angeles, *Nevin 727*, 1882 (NY, UC). *Orange Co.*: e. of Long Beach, Bryant Ranch, *Wolf 3786*, June 28, 1932 (UC, US). *Inyo Co.*: Amargosa Desert, *Roos and Roos 6236*, Sept. 14, 1954 (GH, NY, UC, US, UT). *San Bernardino Co.*: San Bernardino, *Parish 4200*, Sept. 25, 1896 (F, GH, MO, NY, UC, US). *Riverside Co.*: near Santa Ana R., Riverside, *Hall 52*, Sept. 26, 1905 (F, GH, MO, NY, OSU, UC).

7. *SUAEDA OCCIDENTALIS* Wats., Proc. Amer. Acad. Arts Sci. 9: 90. 1874.

Schoberia occidentalis Wats., Bot. King's Expl. 295. 1871.

Dondia occidentalis (Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.

Simple and erect to freely branched and spreading-erect, glabrous, yellowish-green annual, 1-3 dm. tall; branches flexuous, ascending or spreading; leaves numerous, linear, subterete, 0.5-3.0 cm. long, 1.0-1.5 mm. broad, acute to acuminate, reduced gradually in the inflorescence, the leaves there little if at all broader than the lower leaves, 2-4 mm. long; spikes ultimately open, the glomerules of 2-3 flowers not congested along the slender branches; sepals usually distinctly unequal, one or more usually more prominently cross-corrugate than the others, but all somewhat hooded, and often irregularly transverse winged in age, about 1 mm. long, obtusely lobed; seed horizontal, about 1 mm. broad.

Type: From Ruby Valley, Nevada, *Watson 999*, Sept. 1868 (US #49417!).

Slender sea-blite, western seepweed.

Occurs in saline or alkaline flats and marshes in the sagebrush areas of the Great Basin, southeastern Oregon, central Washington, eastern Utah through eastern Idaho, to southern Wyoming, Colorado. Matures in late June to August.

SPECIMENS EXAMINED: WASHINGTON: *Okanogan Co.*: Tonasket, *Thompson 8688*, July 2, 1937 (GH). IDAHO: *Canyon Co.*: Caldwell, *Jensen s.n.*, 1901 (US). OREGON: *Harcy Co.*: eastern Oregon near Nevada line, *Cusick 2031*, July 12, 1898 (F, GH, MO, UC, US). *Lake Co.*: Silver L., *Cusick 2726*, Aug. 5, 1901 (F, GH, MO, NY, UC). CALIFORNIA: *Lassen Co.*: Litchfield, *Hoover 4641*, Sept. 29, 1940 (UC, US). NEVADA: *Elko Co.*: Humboldt Valley, *Watson 997*, Sept. 1868 (GH, NY, US). *Washoe Co.*: Spanish Spring, *Hendrix 876*, Aug. 16, 1938 (UC). *Douglas Co.*: alkali flat, Wellington Quadrangle, *Johannsen 1282*, Sept. 20, 1937 (UC). *Nye Co.*: Potts Ranger Station, *Smith s.n.*, Aug. 10, 1939 (NY). *Lander Co.*: Austin, *Goodner and Henning 873*, July 27, 1937 (TEX). UTAH: *Salt Lake Co.*: salt flats, Salt Lake City, *Jones 1329*, Aug. 25, 1879 (F, NY). *Davis Co.*: west of Syracuse, *Arnou 3809a*, Sept. 3, 1973 (UT). *Utah Co.*: east of Spanish Fork, *Harris C27437*, July 30, 1927 (F, GH, MO). *Tooele Co.*: Great Salt Lake, *Flowers 992*, Aug. 8, 1929 (UT). WYOMING: Gros Ventre River, *Forwood s.n.*, July 31, 1881 (US). *Lincoln Co.*: at Hams Fork and La Barge, *Curtis s.n.*, July 13, 1900 (NY).

8. SUAEDA TORREYANA Wats., Proc. Amer. Acad. Arts Sci. 9: 88. 1874.
Chenopodium maritimum Torr., Ann. Lyc. N. Y. 2: 239. 1828, not *S. maritima* (L.) Dumort. (Type: upper part of Canadian R., New Mexico, ? James 2, NY!).
Chenopodium nigrum Raf., Atl. Jour. 146. 1832. (*nomen nudum*).
Chenopodina linearis Torr. in Stansbury, Expl. Utah 394. 1853, not *C. linearis* Moq. 1849. Type: from mountains on west shore of Great Salt Lake, Utah, Stansbury [Salt Lake Expedition] s.n., May 30, 1850, NY!).
Suaeda fruticosa var. ?*multiflora* Torr., Pac. R. R. Rep. 4: 130. 1857. (Type: Llano Estacado, Ft. Smith to Rio Grande (Tucumcari), New Mexico, Bigelow s.n., Sept. 15, 1853, US #63412!).
Chenopodina moquini Torr., Pac. R. R. Rep. 7(3): 18. 1858, homonym.
Suaeda fruticosa Wats., Bot. King's Expl. 294. 1871, not *S. fruticosa* Forsk. 1775. (Type: central Wyoming, Sweetwater R., Fremont 622, NY!).
Suaeda maritima (Torr.) Wats., Bot. King's Expl. 294. 1871, not *S. maritima* (L.) Dumort. 1827.
Suaeda diffusa Wats., Proc. Amer. Acad. Arts Sci. 9: 88. 1874 (Type: from Truckee Valley, n.w. Nevada, Bailey (Watson) 996, Aug. 1867, GH!).
Suaeda intermedia Wats., Proc. Amer. Acad. Arts Sci. 14: 296. 1879. (Type: from central Utah, C. C. Parry 84, 1875, GH!).
Suaeda moquini (Torr.) Greene, Pittonia 1: 264. 1889.
Dondia multiflora (Torr.) Heller, Cat. N. Amer. Pl. 3. 1898.
Dondia diffusa (Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.
Dondia intermedia (Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.
Dondia moquini (Torr.) Nelson, Bot. Gaz. 34: 363. 1902.
Dondia wilsonii Millsp., Field Columb. Mus. Publ. Bot. 2: 297. 1909. (Type: from S. Caicos I., Bahamas, Percy Wilson 7616, Dec. 14-16, 1907, NY!).
Dondia fruticosa (Wats.) Standley, N. Amer. Fl. 21: 90. 1916.
Dondia nigra (Raf.) Standley, N. Amer. Fl. 21: 89. 1916.
Dondia torreyana (Wats.) Standley, N. Amer. Fl. 21: 90. 1916.
Suaeda nigra (Raf.) Macbride, Contrib. Gray Herb. n.s. 56: 50. 1918.

Perennial, glabrous, 2-8 (-10) dm. high, freely branched, ascending slender branches from a short woody base; leaves linear, with a contracted base and acute tip, 0.5-3.0 cm. long, not crowded (usually at least 2 mm. between nodes), usually reduced in the somewhat paniculate inflorescence, although some plants have glomerules of flowers at the base of the larger leaves below; flowers 1-5 per axil (usually 3, with the center flower larger and functionally staminate); calyx glabrous, cucullate, the lobes cleft more than halfway; seeds 0.8-1.2 (-1.5) mm. broad, black, shiny, vertical or horizontal.

Lectotype (selected by Lundell, 1969): From mountains on west shore of Great Salt Lake, Utah, Stansbury Expedition s.n., May 30, 1850 (NY!).

Torrey sea-blite, alkali seepweed.

Occurs in alkaline soil of interior plains, Oregon to Alberta, south to Baja California, Mexico, east to Texas and West Indies. Plants mature from July to September.

TYPIFICATION: Standley (1916) separated this complex of the American plains into three species: *Suaeda nigra*, *S. fruticosa*, and *S. torreyana*. Examination of types and other cited specimens revealed no essential differences in the calyx types, floral arrangement, leaf characters, and habit. Whether or not the species are annual or perennial is a difficult character, since most of the type specimens are fragments of floral branches. Examination of sets of entire specimens revealed the plants were herbaceous from a woody base. The thickness of the leaf varies with alkalinity of the habitat, but all specimens have acute leaf tips and narrowed bases, whether or not the leaf is very flat, semiterete, or round. Floral characters seem consistent over the range, with a deeply cleft, cucullate calyx. Within a glomerule, the central flower is usually functionally staminate, larger, and has acute sepals, while the two lateral pistillate flowers have more obtuse tips. Seed characters appear consistent.

In his original publication Watson (1874) named several collections to represent his species *S. diffusa* (an annual) and *S. torreyana* (a perennial). Of these, Lundell (1969) selected the plant collected on the Stansbury expedition as lectotype, although the specimen does not have mature flowers. This specimen was also noted by Torrey (1853), but misnamed *Chenopodina linearis*. *Suaeda diffusa* was not selected as the species name since it has been used as a synonym for *S. nigra*, a superfluous name, by Rafinesque as *Chenopodium nigrum*. The specimen taken as type for *C. nigrum* was collected along the upper Canadian River in New Mexico and named *Chenopodium maritima* by Torrey (1828); it is a sterile fragment. The designation *S. torreyana* is preferred in this treatment over *S. fruticosa*, an extensively ranging Old World species, until their true relationship is established.

SPECIMENS EXAMINED: CANADA, ALBERTA: Milk River, *Macoun* 12934, July 10, 1895 (F, NY).

UNITED STATES, NORTH DAKOTA: *Billings Co.*: Sullys Spring, *Stevens* 1290, Aug. 10, 1951 (US). *McKenzie Co.*: n. T. Roosevelt Park, *Stevens* 722, July 16, 1943 (MO, UC). SOUTH DAKOTA: *Harding Co.*: Cave Hills, *Visher* 191, Aug. 2, 1910 (F). *Pennington Co.*: Badlands, *Canby s.n.*, Aug. 12, 1882 (GH, NY). MONTANA: *Wheatland Co.*: 10 mi. e. of Harlowton, *Hitchcock* 2426, Aug. 1934 (MO). *Rosebud Co.*: Birney, *Bennett s.n.*, July 28, 1957 (F, NY, UC, US). IDAHO: *Owyhee Co.*: Bruncau, *Christ* 11130, June 1, 1940 (NY). *Canyon Co.*: Caldwell, *Christ* 14190, July 2, 1943 (NY). *Elmore Co.*: Glens Ferry, *Christ and Ward* 10312, June 22, 1939 (NY). *Ada Co.*: Grandview, *Davis* 2062, June 18, 1940 (F). OREGON: *Harney Co.*: Malheur R., *Cusick* 1939, June 18, 1898 (F, GH, MO, UC, US). NEBRASKA: Ft. Union, *Hayden s.n.*, 1854 (MO). WYOMING: *Albany Co.*: Big Hollow, *Goodman* 4448, July 11, 1947 (TEX). *Sheridan Co.*: Ucross, *Nelson* 9753, Aug. 1916 (MO). *Fremont Co.*: Green River, *Shear* 3346, June 1895 (NY). *Sweetwater Co.*: n. Rock Springs, *Ownbey and Lang* 1146, Aug. 19, 1936 (MO). COLORADO: *Moffat Co.*: Yampa R., 10 mi. w. of Maybell, *Porter and Porter* 3674, July 11, 1945 (GH, MO, TEX, UC). *Montrose Co.*: Naturita, *Payson and Payson* 3880, June 28, 1924 (GH, MO, UC). *Montezuma Co.*: Mancos,

Baker, Earle and Tracy 421, July 8, 1898 (GH, MO, NY, US). Mesa Co.: Grand Junction, *Baker* 925, Aug. 25, 1901 (GH, MO, NY, UC). El Paso Co.: Manitou Springs, *Engelmann s.n.*, Sept. 1, 1881 (MO). Fremont Co.: Canon City, *Bacigalupi* 1053, Aug. 29, 1924 (GH). UTAH: Box Elder Co.: Brigham City, *Zundell* 247, June 19, 1910 (NY). Tooele Co.: 1½ mi. s. of Timpie Station, *Arnow* 511, Aug. 6, 1967 (MO, UT). Juab Co.: Troutcreek, *Maguire and Richards* 2576, Aug. 27, 1933 (UC). Millard Co.: Hatton, *Davis* D2572, June 4, 1930 (UT). Kane Co.: Warm Cr. Rd. near Lake Powell, *Collozzi* 1046, Aug. 30, 1967 (NY). Garfield Co.: Escalante, *Welsh and Welsh* 9412, Sept. 5, 1969 (NY). Wayne Co.: Fruita, *Maguire* 19296, July 1, 1940 (NY). Emery Co.: San Raphael Bridge, *Harrison* 9809, Aug. 21, 1940 (US). Utah Co.: Spanish Fork, *Harris* C27436, July 30, 1927 (F). Salt Lake Co.: Salt Lake, *Garrett* 5009, Oct. 7, 1928 (F, UC, UT). Cache Co.: saline flats, *Flowers* 208, July 1924 (UT). Duchesne Co.: Duchesne R., e. of Myton, *Welsh, Murdock and Shaw* 9435, Sept. 20, 1969 (NY, UT). Carbon Co.: Helper, *Coville and Kearney* 2602, Aug. 1899 (US). Uintah Co.: 20 mi. s. Vernal, *Graham* 6112, June 19, 1931 (F, MO). Sevier Co.: 7 mi. e. Salina, *Anderson* 951, Aug. 25, 1958 (NY, UC). San Juan Co.: Navajo Spring, *Cutler* 3013, Aug. 31, 1939 (GH, MO, NY). NEVADA: Elko Co.: Salt Spring, Pilot Mt., *Holmgren* 1601, July 31, 1941 (GH, NY, UC, US). Humboldt Co.: Humboldt L., *Watson* 998, May 1868 (GH, NY). Washoe Co.: Pyramid L., *Train* 2605, Oct. 28, 1938 (NY). Churchill Co.: Carson L., *Tidestrom* 10784, July 30, 1919 (NY, US). Nye Co.: Amargosa, *Beatley* 9350, July 16, 1969 (NY). Esmeralda Co.: Fish Lake Valley, *Archer* 7243, Sept. 25, 1938 (F, MO, NY). Lincoln Co.: Crystal Spring, *Train* 2412, Aug. 30, 1938 (NY). Storey Co.: Truckee Valley, *Bailey (Watson)* 996, Aug. 1867 (GH, NY, UC, US). CALIFORNIA: Lassen Co.: Honey Lake Valley, *Davey* 3325, June 17, 1897 (UC). Contra Costa Co.: Byron Hot Springs, *Wiggins* 4585, April 17, 1930 (UC). Tulare Co.: Goshen, *Congdon s.n.*, Sept. 1881 (NY). San Joaquin Co.: Lathrop, *Congdon s.n.*, Aug. 26, 1887 (UC). Alameda Co.: Livermore, *Howell* 11441, July 20, 1933 (F, GH, MO, US). Madera Co.: Chowchilla, *Hoover* 1611, Oct. 1, 1936 (UC). Fresno Co.: near Kerman Jct., *Bacigalupi* 2668, July 29, 1941 (GH, UC). Merced Co.: Los Banos Wildlife Refuge, *Nobs and Smith* 22, July 8, 1948 (UC). Inyo Co.: Deep Spring Lake, *Duran* 3308, June 17, 1932 (UC). Kern Co.: Delano, *Wieslander* 484, May 1, 1934 (UC). Los Angeles Co.: Long Beach, *McClatchie s.n.*, May 30, 1891 (NY). San Luis Obispo Co.: Cuyama Ranch, *Peterson* 353, July 9, 1936 (UC). San Bernardino Co.: alkaline flats, Loma Linda, *Munz and Johnston* 8909, July 29, 1924 (GH, NY). Riverside Co.: Perris, *Howell* 4786, May 10, 1930 (MO). Orange Co.: Newport Bay, *Booth* 1247, July 4, 1932 (UC, UC-JEP). San Diego Co.: Chula Vista, *Abrams* 4191, Sept. 10, 1904 (F, GH, MO, NY). Ventura Co.: Pt. Magu, *Howell* 3789, May 19, 1928 (NY). Santa Barbara Co.: Cuyama Beach, *French* 720, Feb. 26, 1936 (UC). ARIZONA: Maricopa Co.: Guadalupe to Montezuma Head, *Killip* 40848, Jan. 19, 1951 (US). Pinal Co.: Sacaton, *Harrison and Kearney* 9056, Aug. 31, 1932 (F). Pima Co.: Tucson, *Griffiths* 2104, Nov. 15, 1900 (NY). Coconino Co.: Tuba City, *Kearney and Peebles* 12878, Sept. 27, 1935 (US). Navajo Co.: Winslow, *Griffiths* 5003, July 8, 1903 (MO). Yuma Co.: Mohawk, *Peebles* 12923, Oct. 12, 1935 (US). Gila Co.: saline bottoms, Whites Mills, Gila R., *Palmer* 216, Sept. 8, 1867 (GH, MO). NEW MEXICO: San Juan Co.: Shiprock, *Standley* 7206, July 25, 1911 (US). Otero Co.: Tularosa, *Birum s.n.*, Oct. 12, 1931 (UC). Chaves Co.: Hagerman, *Benke* 5023, April 27, 1929 (F). TEXAS: Oldham Co.: Tascosa, *Reverchon* 2946, June 24, 1902 (MO). Gonzales Co.: Tharp 78, May 21, 1936 (MO, UC).

Pecos Co.: Llano Estacado, *Bigelow s.n.*, Sept. 15, 1853 (US). *Cameron Co.*: Boca Chica, *Muenschler and Muenschler 14403*, Feb. 26, 1939 (NY, US).

MEXICO, SINALOA: Escuinapa, *Ortega 5180*, 1923 (US). BAJA: 24 mi. s. Punta Prieta, *Wiggins 7739*, Feb. 23, 1935 (F, US). SONORA: Altar, *Wiggins 5992*, Oct. 22, 1932 (F, US). CHIHUAHUA: Bolson de Mapini and Cienega Grande, Saladillo, *Gregg 458*, Sept. 20, 1848 (GH, MO).

CUBA: Salinas de Caimanera, *Hioram 3941*, Aug. 24, 1920 (NY).

BAHAMAS: S. Caicos I., *Wilson 7616*, Dec. 14-16, 1907 (F, GH, NY).

9. *SUAEDA TORREYANA* var. *RAMOSISSIMA* (Standley) Munz, Man. S. Calif. Bot. 144, 1935.

Suaeda suffrutescens Wats., Bot. Calif. 2: 59, 1880, in part.

Dondia ramosissima Standley, N. Amer. Fl. 21: 91, 1916.

Suaeda ramosissima (Standley) Johnston, Proc. Calif. Acad. Sci. Ser. 4. 12(30): 1017, 1924.

Densely short-pubescent throughout, otherwise similar to typical *S. torreyana*.

Type: Lees Ferry, Arizona, *E. W. Nelson 62*, Aug. 24, 1909 (US #564515!).

Bush seepweed.

Occurs in alkaline areas in the interior hot dry deserts, Oregon to Nevada, Utah, California, and northern Mexico.

SPECIMENS EXAMINED: UNITED STATES, OREGON: Malheur Valley, *Griffiths and Morris 709*, Aug. 15, 1901 (MO). NEVADA: *Clark Co.*: Las Vegas, *Gullion 473*, May 4, 1953 (UC). *Nye Co.*: Amargosa Drainage, near Spring Meadows Farm, *Beatley 9794*, Oct. 11, 1969 (NY). *Washoe Co.*: Pyramid L., *Tidestrom 10680*, July 24, 1919 (NY, US). *Douglas Co.*: Topaz, *Hendrix 1091*, June 16, 1939 (UC). *Humboldt Co.*: northern Nevada, *Train 15910*, June 17, 1934 (MU). UTAH: *Tooele Co.*: *Garrett 2773*, June 17, 1914 (F, UT). *Salt Lake Co.*: Salt Lake, *Harrison 317H*, July 12, 1939 (UC). *Millard Co.*: Painter Spring, *Fautin 8930*, June 29, 1939 (UC). *Washington Co.*: St. George, *Cottam 3379*, June 21, 1928 (UT). NEW MEXICO: *Lincoln Co.*: 4 mi. n. Tularosa, *Wootton and Standley s.n.*, Aug. 19, 1907 (US). ARIZONA: *Yuma Co.*: Yuma, *Harter s.n.*, Sept. 20, 1906 (US). *Navajo Co.*: Holbrook, *Rusby 382*, Aug. 20, 1883 (NY). *Coconino Co.*: Lees Ferry, *Nelson 62*, Aug. 24, 1909 (US). CALIFORNIA: *Los Angeles Co.*: Lancaster, *Elmer 3672*, June 1902 (F, GH, NY). *Inyo Co.*: Lone Pine, *Jepson 5122*, July 24, 1912 (UC-JEP). *San Bernardino Co.*: 1 mi. w. Old Woman Spring, *Munz and Johnston 11199*, Sept. 5, 1928 (F). *Fresno Co.*: 23 mi. n.-n.w. of Fresno, San Joaquin R., *Quibell 2292*, June 9, 1953 (UT). *Kern Co.*: Bakersfield, *Eastwood s.n.*, Oct. 4, 1894 (GH). *Riverside Co.*: Salton Basin, Indio, *Parish 8268*, Oct. 8, 1912 (GH, UC, UC-JEP). *Imperial Co.*: Holtzville, *Keller s.n.*, Nov. 11, 1937 (GH, UC). *Tulare Co.*: Earlmont, *Ferris and Rossbach 9670*, May 21, 1938 (GH). *Merced Co.*: Los Banos, *Jussel s.n.*, Aug. 1921 (UC-JEP). *Stanislaus Co.*: Modesto, *Hoover 118*, Oct. 20, 1934 (UC, US).

MEXICO, SONORA: Guayamas, *Jones 27568*, Nov. 6, 1930 (NY, UC).

SINALOA: Labradas, *Ferris and Mexia 5229*, Sept. 21, 1925 (GH). BAJA: Loreto, *Jones 27558*, Oct. 16, 1930 (GH, MO, NY, UC, US).

10. *SUAEDA CALIFORNICA* Wats., Proc. Amer. Acad. Arts Sci. 9: 89, 1874.

Dondia californica (Wats.) Heller, Cat. N. Amer. Pl. 3, 1898.

Stout, densely leafy, shrubby perennial, 2-8 dm. high; leaves deciduous

below, leaving prominent knobby leaf bases; branches ascending, stout, but herbaceous; leaves subterete, 1.5-3.5 cm. long, acute, lanceolate, little reduced in the inflorescence; flowers 1 or 2 per axil, 2.0-3.0 mm. wide; calyx deeply cleft, rounded on back, cucullate; seed 1.5-2.0 mm. broad, shining black.

Type: San Pablo Landing, California, *Bolander 412*, May 1865 (GH!).
California sea-blite.

Occurs in salt marshes along the Pacific Coast, San Francisco Bay, California to Lower California, Mexico. Plants mature July to October.

SPECIMENS EXAMINED: UNITED STATES, CALIFORNIA: *Alameda Co.*: Bay Farm I., *Davy s.n.*, Sept. 24, 1898 (UC). *Sonora Co.*: San Pablo Landing, *Bolander 412*, May 1865 (GH, NY, US). *San Luis Obispo*: sea cliffs, *Ferris and Ferris 7670*, April 16, 1929 (UC). *Santa Cruz Co.*: Anacapa I., *Clokey 4921*, June 4, 1930 (NY, UC). *Santa Barbara Co.*: Santa Cruz I., *Hoffman 548*, Sept. 21, 1930 (F). *Ventura Co.*: Ventura R., *Pollard s.n.*, Feb. 10, 1952 (TEX). *Los Angeles Co.*: Topango Canyon, *St. John 334*, Feb. 15, 1933 (UC). *Orange Co.*: Laguna Beach, *Munz 7320*, April 1, 1923 (NY, UC). *San Diego Co.*: San Diego Bay, *Gander 5519*, May 7, 1938 (UC).

MEXICO, BAJA: Hassler Cove, San Martin I., *Moran 3062*, May 5, 1948 (UC).

11. *SUAEDA CALIFORNICA* var. *TAXIFOLIA* (Standley) Munz, Calif. Fl. 384. 1959.

Suaeda californica var. *pubescens* Jepson, Fl. Calif. 447. 1914, in part.
Dondia taxifolia Standley, N. Amer. Fl. 21: 91. 1916.

Suaeda taxifolia (Standley) Standley, Publ. Field Mus. Nat. Hist. Bot. Ser. 8: 10. 1930.

Much-branched suffrutescent perennial, densely tomentulose or short-villous throughout; branches very stout, 2-10 dm. long, densely leafy; leaves narrowly linear, 1.0-3.0 cm. long, acute to acuminate, terete, those of the inflorescence crowded and little reduced (exceeding flower clusters), leaving prominent knobby leaf bases; flowers 1-4 per axil, 2.5-3.0 mm. broad; calyx cucullate, densely pubescent; seed 1.5-2.0 mm. broad, black.

Type: From salt marshes, Playa del Rey, Los Angeles Co., Calif., *LeRoy Abrams 2490*, June 10, 1902 (US #614215! Isotype NY!).

Woolly sea-blite.

Occurs in salt marshes along coast of California, Santa Barbara Co. to Baja California, Mexico.

SPECIMENS EXAMINED: UNITED STATES, CALIFORNIA: *Santa Barbara Co.*: Santa Cruz I., *Hoffmann 546*, Sept. 21, 1930 (F). *Kern Co.*: Rosamond, *Davy 2264b*, May 9, 1896 (UC). *Ventura Co.*: beach, 8 mi. n. of Ventura, *Munz 12922*, Sept. 10, 1932 (A F, MO, MU, UC). *Los Angeles Co.*: Ballast Point, Santa Catalina I., *Nuttall 805*, Aug. 21, 1920 (F, MO). *San Diego Co.*: beach at Del Mar, *Peebles 315*, Aug. 29, 1930 (A). *Orange Co.*: Santa Anas River bridge, Newport Beach, *Keller s.n.*, Nov. 26, 1937 (GH, UC).

MEXICO, BAJA: Laguna Mormona, *Johnson 130*, March 25, 1973 (DAV).
San Martin I., *Howell 10716*, Aug. 19, 1932 (F, MO, NY, UC, US).

12. *SUAEDA CALIFORNICA* var. *PUBESCENS* Jepson, Fl. Calif. pt. IV: 447. 1914.
Dondia brevifolia Standley, N. Amer. Fl. 21: 92. 1916, not *Suaeda brevifolia* Phil. 1895. (Type: Newport, Calif., Davidson 1779, Sept. 1907 US #692799!).
Suaeda brevifolia (Standley) Eastwood, Proc. Calif. Acad. Sci. Ser. IV. 18(14): 479. 1929.
Suaeda brachyphylla Standley, Publ. Field Mus. Nat. Hist. Bot. Ser. 8: 10. 1930, (*nom nov.* for *D. brevifolia* Standley) not Phil. 1895.
Suaeda taxifolia ssp. *brevifolia* Abrams, Fl. Pac. States 2: 96. 1944.

Leaves short (0.3-0.8 cm.), obtuse to rounded at apex, with persistent knobby leaf bases; flowers smaller than those of the typical species (1.0-1.5 mm. broad); entire plant covered with very short, dense pubescence.

Type: Newport, Calif., Davidson 1779, Sept. 1907 (US #692799!).

Occurs in salt marshes along the coast of California, Sonoran Zone, Santa Barbara Co. and south into Baja and Lower California, Mexico, and Sinaloa, Mexico.

SPECIMENS EXAMINED: UNITED STATES, CALIFORNIA: *Orange Co.*: Newport Beach, Davidson 1779, Sept. 1907 (US). *Los Angeles Co.*: Santa Monica, Hasse s.n., Aug. 19, 1889 (NY).

MEXICO, BAJA: Magdalena Bay, Mason 1910, May 29, 1925 (GH). SONORA: Puerto Libertad, Wiggins 6073, Oct. 25, 1932 (US). SINALOA: Cerros de Navachiste, Gentry 14358, Sept. 26, 1954 (US).

13. *SUAEDA PALMERI* (Standley) Standley, Publ. Field Mus. Nat. Hist. Bot. Ser. 8: 10. 1930.
Dondia palmeri Standley, N. Amer. Fl. 21: 91. 1916.

Glaucous, much branched perennial, suffrutescent; branches stout, ascending or somewhat spreading, mostly simple, densely white-tomentulose when young, often glabrate in age; leaves terete, 0.3-0.7 cm. long, 1.5-2.0 mm. thick, rounded at apex, narrowed at base, white-tomentulose when young, spreading, those of the inflorescence little reduced; flowers globose-obovoid, 1.5-2.0 mm. broad, 1 or 2 per axil; bracts rounded or obtuse at apex; calyx glaucous, glabrous or nearly so, cleft to the middle or lower, the lobes obtuse, rounded on back, cucullate, fleshy; seed usually horizontal, 1.5 mm. broad, black; styles 3, 'feathery'.

Type: Near Parras, Coahuila, Mexico, E. Palmer 1168, June 1880 (US #48315!).

Occurs in north central Mexico.

SPECIMENS EXAMINED: MEXICO, COAHUILA: 4 mi. w. of Cuatro Ciéngas, Johnston 7138, Aug. 24, 1938 (GH, TEX). ZACATECAS: Concepcion del Oro, Henrickson 14370, Sept. 26, 1974 (CSULA).

14. *SUAEDA SUFFRUTESCENS* Wats., Proc. Amer. Acad. Arts Sci. 9: 88. 1874.
Dondia suffrutescens (Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.

Much branched suffrutescent perennial 3-10 dm. high, copiously tomen-

tulose throughout, the pubescence loose and spreading; branches ascending, paniculately branched; leaves terete, mostly 0.5-1.3 cm. long, much reduced in the inflorescence, all acute, not crowded; flowers 1.0-1.5 mm. broad, 1-6 (-9) clustered in axils, crowded in dense spikes; calyx cleft to below middle, the lobes obtuse, relatively thin, cucullate, densely short pubescent as the leaves and stems; seed 0.7-1.0 mm. broad, black.

Lectotype (selected by Lundell, 1969): From the Rio Grande, *Maj. Wm. H. Emory s.n.*, Oct. 6, 1846 (NY!).

Desert seepweed.

Occurs in alkaline gypseous plains and valleys, western Texas, New Mexico, Oklahoma, Arizona, south into northern Mexico.

SPECIMENS EXAMINED: UNITED STATES, OKLAHOMA: *Major Co.*: Orienta, *Waterfall 7544*, July 11, 1947 (MO, NY, TEX). *Tillman Co.*: Hollister, *Waterfall 7296*, June 27, 1947 (MO, TEX). TEXAS: *Crane Co.*: Buena Vista, *Warnock 15608*, July 13, 1957 (TEX). *Pecos Co.*: Ft. Stockton, *Mears 1546*, May 28, 1967 (TEX). *Reeves Co.*: Pecos to Barstow, *Tharp and Gimbride 51-994*, July 7, 1951 (TEX). *Culberson Co.*: gypsum soil, east of Daugherty, *Waterfall 5189*, July 20, 1943 (GH, MO, NY). *Hudspeth Co.*: Ft. Quitman, *Cory 31045*, Oct. 24, 1938 (GH). *El Paso Co.*: El Paso, corner of Country Club Rd. and Montoya, *Blackwell 2329*, July 14, 1976 (MU). *Jeff Davis Co.*: Chispa, *Waterfall 5319*, July 26, 1943 (F, GH, MO, NY). *Presidio Co.*: along Rio Grande R., Porvenir, *York 48249*, July 7, 1948 (TEX). *Brewster Co.*: Lajitas, *Warnock 953*, July 17, 1937 (GH, TEX, US). *Ward Co.*: east of Pecos, *Waterfall 5504*, Aug. 6, 1943 (MO, NY). NEW MEXICO: *Chaves Co.*: Roswell, *Waterfall 4314*, Aug. 23, 1942 (GH). *Eddy Co.*: Carlsbad, *Standley 40337*, Aug. 12, 1924 (US). *Lincoln Co.*: White Mts., *Wooton 191*, July 22, 1897 (GH, MO, NY, UC, US). *Dona Ana Co.*: sandy bank at end of Camino Real just beyond El Paso city limits, *Blackwell 2334*, July 14, 1976 (MU). *Otero Co.*: White Sands, Alamogordo, *Fisher 54*, Aug. 6, 1931 (F). *Catron Co.*: Bat Cave Wells, *Smith 63*, July 2, 1948 (GH). ARIZONA: *Navajo Co.*: Holbrook, *Zuck s.n.*, July 10, 1897 (NY, US).

MEXICO, COAHUILA: Laguna del Coyote, *Henrickson 14269a*, Sept. 22, 1974 (CSULA). Laguna de Leche, *Johnston 8629*, Aug. 30, 1941 (GH, MO). CHIHUAHUA: Rio Grande, Paso del Norte, *Pringle 1997*, Sept. 9, 1888 (F, MO, NY, UC, US).

15. *SUAEDA SUFFRUTESCENS* var. *DETONSA* Johnston, Jour. Arnold Arb. 24: 230, 1943.

Suaeda nigrescens Johnston, Jour. Arnold Arb. 24: 228-229, 1943. (Type: from La Ventura, Coahuila, Mexico, *Johnston 7650*, Sept. 12, 1938. GH!).

Suaeda nigrescens var. *glabra* Johnston, Jour. Arnold Arb. 24: 228-229, 1943. (Type: from Ft. Quitman, Hudspeth Co., Texas, *Waterfall 3993a*, Aug. 18, 1942 GH!).

Leaves glabrous, green to glaucous, 0.3-1.3 cm. long, obtuse to acute tips; stems more or less pubescent, the leaves and calyx usually glabrous; other characters like typical *S. suffrutescens*.

Type: From 3 mi. west of Cuatro Cienegas, saline flats, loosely and widely branched, 1-5 ft. tall, frequently supported by other bushes, *Johnston 7128*, Aug. 24-26, 1938 (GH!).

Occurs in saline gypseous soils in trans-Pecos Texas, along the Rio Grande and Pecos valleys in adjacent New Mexico and south into southern Chihuahua and Coahuila, Mexico.

DISCUSSION: It is difficult to distinguish between this variety and specimens identified as *S. nigrescens* and its variety *glabra*, since leaf characters, inflorescence, branching patterns and distribution are very similar. There is some difference in degree of stem pubescence, and it may be shown later that *S. nigrescens* and *S. nigrescens* var. *glabra* are distinct from *S. suffrutescens* var. *detonsa* genetically. Until these differences, if they exist, can be shown taxonomically, doubtful specimens will be placed under *S. suffrutescens* var. *detonsa*. The flowers are also more densely clustered than on typical *S. torreyana*, with which members of this variety might also be confused.

SPECIMENS EXAMINED: UNITED STATES, TEXAS: *Gonzales Co.*: 50 mi. e. of San Antonio, salt flats near Pilgrim, *Cory 19213*, Aug. 23, 1936 (GH). *Brewster Co.*: Tornillo Creek, Hot Springs, *Sperry 1637*, Mar. 26, 1939 (GH). *Andrews Co.*: Shafter L., *Tharp s.n.*, July 10, 1941 (TEX). *Hudspeth Co.*: Rio Grande, near Ft. Quitman, *Waterfall 3993a*, Aug. 18, 1942 (GH). NEW MEXICO: *Otero Co.*: White Sands, *Archer 7334*, Oct. 19, 1938 (GH). *Chaves Co.*: Hagerman, *Benke 5023*, Apr. 27, 1923 (GH).

MEXICO, COAHUILA: Monclova to Cuatro Ciénegas, *Johnston 7128*, Aug. 24-26, 1938 (GH). SAN LUIS POTOSI: alkaline flat, San Miguel, *Johnston 7619*, Sept. 11-12, 1938 (GH). CHIHUAHUA: Mecoqui, *LeSeuer 197*, Aug. 24, 1935 (GH, TEX). ZACATECAS: west of Guadalupe Carceron, *Johnston, Wendt and Chiang 11597*, July 3, 1973 (CSULA).

16. SUAEDA MEXICANA (Standley) Standley, Publ. Field Mus. Nat. Hist. Bot. Ser. 4: 203. 1929.

Dondia mexicana Standley, N. Amer. Fl. 21: 89. 1916.

Annual herbs, glabrous, 3-12 dm. tall, mostly branched at the base; branches numerous, ascending or nearly erect, elongate; leaves numerous but not crowded, linear, semiterete, the lower leaves 1.2-4.0 cm. long, 1.2 mm. broad, acuminate or attenuate, those of the inflorescence shorter; inflorescence paniculately branched, the branches erect; flowers crowded in the axils and forming spikes 4-5 mm. thick; calyx deeply cleft, the lobes rounded, becoming more enlarged at the base, strongly cucullate-carinate in age, the fruiting calyx 3 mm. broad; stamens exerted at maturity; seed ca. 0.8 mm. broad, horizontal, shining dark brownish-red; styles 2, 'feathery'.

Type: From San Luis Potosi, Hacienda Angostura, alkaline plain near San Bartolo Station, Mexico, *C. G. Pringle 3788*, July 15, 1891 (US #48314!).

Mexican seepweed.

Occurs in western Texas, south into San Luis Potosi, Mexico.

SPECIMENS EXAMINED: MEXICO, COAHUILA: 3 mi. west of Cuatro Ciénegas, *Henrickson 14292*, Sept. 23, 1974 (CSULA). SAN LUIS POTOSI: Las Tables, *Pennell 18047*, April 9-10, 1934 (GH, US).

17. *SUAEDA JACOENSIS* Johnston, Jour. Arnold Arb. 24: 228. 1943.

Annual or perennial succulent, 1-3 dm. tall, glabrous, pale green, branching from small caudex crowning a coarse persisting root; stems slender, somewhat purplish verrucose (warty), numerous, erect, rigid, simple or sparsely branched; leaves linear, 1-2 cm. long, ca. 1.2 mm. wide, compressed succulent, the apex obtuse, apiculate; the lower leaves conspicuously opposite, the others alternate; flowers axillary, subsessile, clusters distant (usually 2-3 mm. apart), subspicate; bracts hyaline, triangular or oblong, dentate or inconspicuously lacerate-dentate; calyx in fruit irregularly crispate and carinate, some almost appendaged with corky tubercles, or with a vertical as well as a transverse basal wing that may be corky-thickened and prolonged off obliquely at the base; seed horizontal, 1.1-1.3 mm. broad, shiny black-brown; styles 2, 'feathery'.

Type: From salt flats at southeastern end of Laguna de Jaco, common, western Coahuila, Mexico, *Stewart and Johnston* 1975, Oct. 4-5, 1941 (GH!).

Apparently an endemic species on flats at southeastern end of Laguna de Jaco, Coahuila, Mexico, where the soil is strongly saline and gypsiferous.

SPECIMENS EXAMINED: MEXICO, COAHUILA: Laguna de Jaco, *Henrickson* 14215, Sept. 20-21, 1974 (CSULA).

18. *SUAEDA TAMPICENSIS* (Standley) Standley, Publ. Field Mus. Nat. Hist. Bot. Ser. 8: 10. 1930.

Dondia tampicensis Standley, N. Amer. Fl. 21: 91. 1916.

Green, much branched perennial, the branches stout, ascending or decumbent, suffrutescent, copiously short-villous, paniculately branched; leaves terete, 7-15 mm. long, acute or acuminate, spreading, those of the inflorescence little reduced; flowers 1.5-2.0 mm. broad, globose-obovoid, 1-5 per axil; bractlets acuminate; calyx glabrous or nearly so, cleft to below the middle, the lobes rounded at the apex, fleshy, cucullate; seed usually horizontal, 1 mm. broad, black, shiny.

Type: Along the coast near La Barra, Tamaulipas, 8 km. east of Tampico, Mexico, *Edward Palmer* 262, Feb. 1910 (US #463200!).

Occurs in coastal sandy areas, southern Texas and eastern coast of Mexico, also in the West Indies.

SPECIMENS EXAMINED: UNITED STATES, TEXAS: Cameron Co.: 11 mi. east of Brownsville, *Correll and Johnston* 17957, July 13, 1957 (A). Starr Co.: Rio Grande City, *Tharp* 5783, June 16, 1928 (TEX, US). Kenedy Co.: Padre I., *Tharp* 5567, June 1922 (TEX).

MEXICO, TAMAULIPAS: Matamoras, *Wootton s.n.*, June 29, 1919 (US).

DOMINICAN REPUBLIC: Isla de Cabritos, Laguna de Enriquillo, *Ekman* 9860, April 16, 1928 (GH, US).

HAITI: Bocazelle, Artibonite Plains, *Sweet s.n.*, 1925 (NY, US).

19. *SUAEDA CONFERTA* (Small) Johnston, Jour. Arnold Arb. 24: 230. 1943.

Dondia conferta Small, Bull. N. Y. Bot. Gard. 1: 280. 1899.

Lerchea conferta (Small) K. Schumann in Just., Bot. Jahrb. 27(1): 482 1901.

Dondia insularis Britton, Bull. N. Y. Bot. Gard. 4: 138. 1906. (Type: from Grand Turk I., Bahamas, Nash and Taylor 3873, Aug. 27-Sept. 1, 1905, US #847951!).

Perennial suffrutescent shrub, stems erect or ascending, 4-10 dm. long, the branches prostrate or spreading, forming dense tufts, very brittle, glabrous; leaves numerous, glabrous, the leaf-blades fleshy and blue-gray (glaucous), mostly less than 1 cm. long, 1-2 mm. broad, oblong; flowers solitary or clustered in the axils of the rather approximate leaves, especially numerous on the branchlets; calyx lobes obtuse, cucullate, seed about 1 mm. broad, black.

Type: From coastal flats, Corpus Christi, A. A. Heller 1827, June 2-6, 1894 (US #213983!).

Along the Atlantic Coast of Texas and Mexico, also in the West Indies.

SPECIMENS EXAMINED: UNITED STATES, TEXAS: *Nueces Co.*: Corpus Christi, Young s.n., Mar. 14, 1914 (MO, TEX). *San Patricio Co.*: Ingleside, Cory 45326, July 25, 1944 (GH). *Cameron Co.*: Yucca I., Johnston 542359, Dec. 23, 1954 (TEX). *Hidalgo Co.*: Clover 1189, May 24, 1933. *Kenedy Co.*: Padre I., Cutak 29, July 26, 1938 (MO). *Aransas Co.*: Rockport, Reverchon 1788, July 1893 (MO). *Kleberg Co.*: Laguna Madre, King Ranch, Johnston s.n., July 3, 1953 (TEX).

HAITI: Plains de la Artibonite, Ekman H3342, Feb. 27, 1925 (GH).

DOMINICAN REPUBLIC: Santo Domingo, Isla de Bauritas, Ekman H9860, Apr. 16, 1928 (A).

BAHAMAS: Grand Turk I., Nash and Taylor 3873, Aug. 27, 1905 (F, US).

DOUBTFUL AND EXCLUDED SPECIES

1. *Suaeda duripes* Johnston, Jour. Arnold Arb. 24: 231. 1943. (Type: from Texas, Pecos River, salt soil, Geo. Thurber 114, Nov. 1850 GH!). = ? *S. suffrutescens* var. *detonsa*. Known only from the type collection, said by Johnston (1943) to be endemic to Reeves and Pecos Cos., Texas.
2. *Suaeda fernaldii* (Standley) Standley, Publ. Field Mus. Nat. Hist. Bot. Ser. 4: 203. 1929. (Type: from red sandstone alluvium near mouth of Salmon River, Truro, Colchester Co., Nova Scotia, Fernald and Wiegand 3324, Sept. 11, 1910 GH!, fragment and photo US!, photo NY!), as *Dondia fernaldii* Standley, N. Amer. Fl. 21: 88. 1916. Known only from the type collection. It may be a local variant of *S. americana*.

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